

# Claims

1. Brake device for a construction machine, comprising a first brake circuit (2), which is coupled to a first brake member (4) on a first wheel axle (6) of the machine, a second brake circuit (8), which is coupled to a second brake member (10) on a second wheel axle (12) of the machine, the first and second brake circuits (2, 8) being independent of one another, a pressure source (14) for hydraulic oil, which is coupled to the first and second brake circuit (2, 8), a brake valve (16, 16'), which is coupled to the first and second brake circuit (2, 8), which brake valve (16, 16') is designed to control the hydraulic oil from the pressure source (14) to the brake members (4, 10) on the wheel axles (6, 12), and a brake pedal (30) coupled to the brake valve (16, 16') arranged so as to control the brake valve (16, 16') **characterized by** a limiting element (18, 36, 42') arranged in the first or second brake circuit (2, 8), which element limits the pressure and/or flow of hydraulic oil when the brake valve (16, 16') controls the hydraulic oil from the pressure source (14) to the brake members (4, 10) on the wheel axles (6, 12), and that the limiting element (18, 36, 42') is adapted to limit the flow to the brake member (10) in the brake circuit (8) of the limiting element (18, 36, 42') up to a predetermined hydraulic oil pressure and to open for a through flow of hydraulic oil, when the predetermined pressure is reached to achieve a delayed activation of the brake member (10) in the brake circuit of the limiting element (18, 36, 42').

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2. Brake device according to Claim 1, **characterized in that** the limiting element comprises a sequence valve (18), which opens when the hydraulic oil pressure reaches a predetermined pressure.

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3. Brake device according to either of Claims 1 and 2, **characterized in that** the limiting element comprises a restrictor valve (42'), which limits the flow of hydraulic oil.

5 4. Brake device according to either of Claims 2 and 3, **characterized in that** a first bypass line (22) is connected over the limiting element (18, 42') so that hydraulic oil is allowed to bypass the limiting element (18, 42') and that a  
10 non-return valve (24) is arranged in the first bypass line (22), so that hydraulic oil is prevented from flowing through the first bypass line (22) in the direction towards the brake member (4, 10).

15 5. Brake device according to Claim 2, **characterized in that** a second bypass line (40) is connected over the sequence valve (18) and that a restrictor valve (42) is arranged in the second bypass line (40), so that a limited flow of hydraulic oil can bypass the sequence valve (18).

20 6. Brake device according to Claim 1, **characterized in that** the brake valve (16') comprises the said limiting element (36).

25 7. Brake device according to Claim 6, **characterized in that** the brake valve (16') comprises a first slide (32), which controls the flow of hydraulic oil in the first brake circuit (2), and a second slide (34), which controls the flow of hydraulic oil in the second brake circuit (8), which  
30 first slide (32) is arranged so as to control the second slide (34), so that the second slide (34) opens the second brake circuit (8) when the pressure in the first brake circuit (2) has reached a predetermined pressure.

8. Brake device according to Claim 7, **characterized in that** the limiting element comprises a first spring (36), which acts on the second slide (34)

5 9. Method of braking a constuction machine comprising a brake device provided with a first brake circuit (2), which is coupled to a first brake member (4) on a first wheel axle (6) of the machine, and a second brake circuit (8), which is coupled to a second brake member (10) on a second wheel axle  
10 (12) of the machine,

**characterized in**

that the first brake member (4) is activated when depressing the brake pedal only a short way, and that the second brake member (10) is essentially activated with delayed effect.

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10. Method according to Claim 9,

**characterized in**

that the hydraulic oil pressure to the second brake member (10) is limited until a predetermined hydraulic oil pressure  
20 to the first brake member (4) is reached, and that the second brake member (10) is essentially activated when said predetermined hydraulic oil pressure to the first brake member (4) is reached.

53/55 11. Method according to any of Claim 9-10

**characterized in**

that the second brake member (10) is essentially continuously activated until said predetermined pressure is reached.

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12. Method according to any of Claim 9-11,

**characterized in**

that a pressure controlled valve (18) in the brake circuit to the second brake member (10) is opened when said  
35 predetermined pressure is reached.

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